

# Quantum Fields in Curved Spaces and Holography

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**Abstract:** Quantum fields in curved spacetimes have been extensively studied in past. Here we develop a technique relating scalar fields in conformally flat spacetimes. Vanishing Weyl tensor for FRW spacetimes implies conformal flatness. We extend the technique to general spacetime dimensions for both minimal and non-minimal couplings of the scalar fields. The masses of the scalar fields are related by a conformal factor "F" relating the two spacetimes. We study energy conditions and give some examples of related spacetimes with massive and massless fields. The 2-point correlators of the scalar fields and the renormalized stress tensors for both the spacetimes are related by the function "F".

We also study scalar fields in AdS-FRW spacetimes. As solutions of Einstein's equations with negative cosmological constant can be constructed with time dependent backgrounds having perfect fluid matter, so we can construct AdS-FRW spacetimes with scalar fields propagating in the bulk. We try to relate the 2-point correlators for AdS-Milne and AdS-radiation dominated geometries in the light of the prescription we developed.

## References

[1] Swayamsidha Mishra, Sudipta Mukherji and Yogesh Kumar Srivastava, Modern Physics Letters A, Vol. 33, No. 1 (2019) 1950348 (14 pages) [DOI: 10.1142/S0217732319503486] [arXiv:1810.09677v2 [gr-qc] 9 Aug 2019]